

**REMARKS**

Claims 1 – 20 are pending. The applicants respectfully request reconsideration and allowance of this application in view of the above amendments and the following remarks.

Independent claims 1, 13 and 14 have been amended. Support for the amendment can be found in the specification, for example, page 5 line 2, page 13 line 7, and page 15 line 24.

Claims 1, 2, 4 and 10 (and also claims 11 – 15 and 17) were rejected under 35 USC 103(a) as being unpatentable over U.S. Patent No. 5,108,159, Tsang et al. (“Tsang”) in view of U.S. Publication 2001/0017077, Kuragaki et al. (“Kuragaki”) or U.S. Patent No. 5,636,908, Yamamuro (“Yamamuro”). Claims 3 and 16 were rejected under 35 USC 103(a) as being unpatentable over Tsang in view of Kuragaki or Yamamuro, further in view of U.S. Patent No. 6,142,581, Yamaguchi et al. (“Yamaguchi”). Claims 5 – 9 and 18 – 20 were rejected under 35 USC 103(a) as being unpatentable over Tsang in view of Kuragaki or Yamamuro, and further in view of U.S. Patent No. 6,109,703, Takahishi (“Takahishi”). Insofar as the rejections may be applied to the claims as amended, the rejections are respectfully traversed for reasons including the following.

As described in the application, one or more aspects of the invention as claimed are directed to suppressing and preventing noise including brake noise, by controlling a dither current that is superimposed on a target supplied to a brake driving actuator. (Specification, page 2, lines 18 – 25.)

According to independent claim 1, there is provided a vehicle brake system for generating braking force in each vehicle wheel according to operation of a brake pedal. A brake force regulating portion is provided that is controlled by dither current and generates the braking force. A brake noise detecting portion is provided for detecting at least one of brake noise

generation and a possibility thereof in each vehicle wheel. Also provided is a control portion for controlling the dither current. When either the brake noise generation or the possibility thereof is detected by the brake noise detecting portion, the control portion changes at least one of an amplitude and a cycle of the dither current to suppress brake noise by applying vibration with a frequency different from a self-excited vibration of the brake noise to the braking force regulating portion. (See also independent claims 13 and 14.)

In operation, the dither current is applied to a valve to suppress brake noise by changing the braking force generated by a brake caliper or a brake rotor. In other words, by applying the dither current to the braking force generating portion, a vibration with a frequency different from the frequency of the dither current is generated on the brake caliper or the brake rotor. The brake caliper or the brake rotor is a different part from the braking force generating portion. Therefore, the dither current disclosed in the present invention is used to generate the vibration on the brake caliper or the brake rotor that is different from an object to which the dither current is applied.

Independent claim 1 has been amended to recite, in combination, for example, that “when either the brake noise generation or the possibility thereof is detected by the brake noise detecting portion, the control portion changes at least one of an amplitude and a cycle of the dither current to suppress brake noise by applying, to the braking force regulating portion, a vibration with a frequency different from a self-excited vibration of the brake noise.” Independent claims 13 and 14 similarly have been amended. The braking force regulation portion can correspond to, for example, the illustrated linear valve (9) (see Fig. 1).

Tsang discloses a noise attenuated anti-lock brake system. The office first and second actions conceded that Tsang lacks a dither current for controlling the valves upon the detection of excessive noise levels.

In addition, Tsang fails to teach or suggest that “the control portion changes at least one of an amplitude and a cycle of the dither current to suppress brake noise by applying vibration with a frequency different from a self-excited vibration of the brake noise to the braking force regulating portion.”

In order to cure the deficiencies of Tsang, the office action cites Kuragaki or Yamamuro, alleging that these references both teach using dither currents to smooth out the operation of solenoid valves and thereby reduce noise. The office action argues that it would have been obvious to have utilized the dither current of Kuragaki or Yamamuro in Tsang in order to minimize noise and promote smoother operation of the electromagnetic valves.

However, Yamamuro only discloses that a dither current with a constant value is used to suppress hysteresis. Yamamuro states for example “such micro-vibration of the solenoid plunger is transmitted via the snap rings 41a and 41b to the valve spool 4. This micro-vibration prevents undesirable hysteresis of the controlled fluid pressure owing to sliding resistance of the valve spool 4 and enhances a responsiveness of the control valve” (Col. 16, lines 56 – 59). An amplitude or a cycle of the dither current is not changed in response to the brake noise generation or possibility thereof.

Kuragaki is similarly deficient. Kuragaki only discloses that an amplitude of the dither current is changed to suppress the electromagnetic noise of a valve for securing control performance. E.g., “current dither is applied when pressure increase or decrease is necessary, the current dither is not applied with the pressure command  $P_r$  is constant and it is necessary to increase or decrease the pressure, whereby it is possible to reduce electric wave noises.” (Paragraph 0026.) Kuragaki does not mention braking noise.

None of the cited references teach or suggest that the dither current is used for controlling a braking force regulating portion. Moreover, the cited references fail to teach or suggest that the amplitude or frequency of the dither current is changed by the control portion for suppressing the braking noise.

Tsang does not teach or suggest a dither current for controlling the valves upon detection of excessive noise levels. Consequently, neither Tsang, Kuragaki, nor Yamamuro, alone or in combination, teach or suggest, let alone disclose, anything concerning utilizing dither current for reducing brake noise.

Moreover, there is no suggestion or motivation to combine the references. The office action states on page three that it would be been obvious to “have used a ‘dither current’ in the device of Tsang to control the actuation of the valves and in order to minimize noise and promote smoother operation of the electromagnetic valves, as taught by Kuragaki or Yamamuro.” However, Tsang itself does not provide a motivation to combine its brake system for attenuating noise produce by vibrations with a dither control. Neither Kuragaki or Yamamuro provide a motivation to use the dither current for the purpose of changing the brake noise.

For at least these reasons, the combination of features recited in independent claim 1, when interpreted as a whole, is submitted to patentably distinguish over the prior art. In addition, the references clearly fail to show other claimed features as well.

With respect to the rejected dependent claims, applicant respectfully submits that these claims are allowable not only by virtue of their dependency from independent claim 1 or 14, but also because of additional features they recite in combination.

Applicants respectfully submit that, as described above, the cited prior art does not show or suggest the combination of features recited in the claims. Applicants do not concede that the

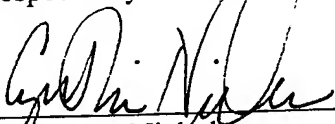
cited prior art shown any of the elements recited in the claims. However, applicants have provided specific examples of elements in the claims that are clearly not present in the cited prior art.

Applicants strongly emphasize that one reviewing the prosecution history should not interpret any of the examples applicant has described herein in connection with distinguishing over the prior art as limiting to those specific features in isolation. Rather, for the sake of simplicity, applicant has provided examples of why the claims described above are distinguishable over the cited prior art.

In view of the forgoing, the applicants respectfully submit that this application is in condition for allowance. A timely notice to that effect is respectfully requested. If questions relating to patentability remain, the examiner is invited to contact the undersigned by telephone.

Please charge any unforeseen fees that may be due to Deposit Account No. 50-1147.

Respectfully submitted,

  
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